| LG Chem Yeosu Complex | Material Safety Data Sheet | Identity No. | GHS – 3AA - 002 |
|---|---|---|---|
| | **ETHYL ACRYLATE**<br>**CAS No. : 140-88-5** | Pages | 1/13 |

## 1. Identification of the product and the supplier

1) Product name : ETHYL ACRYLATE, INHIBITED

2) Advisable use and Restriction
○ Advisable use :
- textiles Sizing Agents, paint & ink, adhesive, flexible Resin, felt bonding agent

○ Restriction of product using : Not available

3) Manufacturer/Supplier/Distributor information
○ Company : LG Chem, LTD. Acrylate plant
○ Address : 451, Sandanjungang-ro, Yeosu-si, Jeollanam-do
○ Emergency response number : 061-680-6910
○ Respondent : 3AA Team

## 2. Hazard identification

1) Hazard classification :

- Flammable liquid : Category 2
- Acute toxicity (oral) : Category 4
- Acute toxicity (dermal) : Category 4
- Acute Toxicity(inhalation: vapour) : Category 3
- Skin corrosion/irritation : Category 1C
- Eye Damage/Irritation : Category 1
- Skin sensitization : Category 1
- Carcinogenecity : Category 2
- Target Organ Systemic Toxicity(single exposure) : Category 3 (respiratory irritation)
- Target Organ Systemic Toxicity(repeated exposure) : Category 2
- Acute aquatic toxicity : Category 2

2) Allocation label elements

○ Pictogram and symbol

○ Signal word : Danger

○ Hazard statement

H225 Highly flammable liquid and vapour
H302 Harmful if swallowed
H312 harmful in contact with skin
H314 Causes severe skin burns and eye damage
H317 May cause an allergic skin reaction
H318 Causes serious eye damage
H331 Toxic if inhaled
H335 May cause respiratory irritation
H351 Suspected of causing cancer
H373 May cause damage to organs through prolonged or repeated exposure.
H401 Toxic to aquatic life

○ Precautionary statements

- Prevention: P201: Obtain special instructions before use.
p202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from flames and hot surfaces. - No smoking
P233: Keep container tightly closed.
P240: Ground/bond container and receiving equipment.
P241: Use explosion-proof electrical/ventilating/lighting/ equipment.
P242: Use only non-sparking tools.
P243: Take precautionary measures against static discharge.
P260+P261: Do not breathe dust/fume/gas/mist/vapours/spray.
P264: Wash thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area.
P272: Contaminated work clothing should not be allowed out of the workplace.
P273: Avoid release to the environment.
P280: Wear protective gloves/protective clothing/eye protection/face protection
P281: Use personal protective equipment as required.
- Response: P301+P310+P311+P312+P314: If swallowed or inhaled: Immediately call a POISON CENTER or doctor/physician If you feel unwell.
P301+P330+P331: If swallowed: Rinse mouth. Do not induce vomiting.
P308+P313: If exposed or concerned: Get medical advice/attention.
P302+P352: If on skin: Wash with plenty of soap and water.
P363: Wash contaminated clothing before reuse.
P303+P361+P353: If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P321+P322: Specific measures or treatment as reference to supplemental first aid instruction.
P304+P340: If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338: In IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and wash do. Continue rinse.
P370+P378: In case of fire: Use for extinction
P333+P313: IF skin irritation or rash occurs: Get medical advice/attention.
- Storage : P403+P235+P233 : Store in a well-ventilated place. Keep container tightly closed and cool.
P405: Store locked up.
-Disposal : P501: Dispose of contents/container to in accordance with local/regional/ national/international regulations (to be specified).

3) Other hazard information not included in hazard classification
- NFPA Rating system : Health: **2,** Flammability: **2,** Reactivity: **3**

## 3. Composition/information on ingredients

| Chemical Name | Common name Synonyms | CAS No. | Content (%) |
|---|---|---|---|
| ETHYL ACRYLATE, INHIBITED | ETHYL PROPENOATE, ETHYL ESTER, ETHYL 2-PROPENOATE | 140-88-5 | Min 99.5 |
| HYDROQUINONE | - | 123-31-9 | - |
| 4-METHOXYPHO | - | 150-76-5 | - |
| OTHER ANTIPOLYMERIZE AGENT | - | - | - |

## 4. First-aid measures

1) Eye contact :
-In case of contact with chemicals, immediately flush eyes with running water for more than 15 minutes.
-Remove contact lenses if present and easy to do.
-Immediately get immediate medical advice/attention.

2) Skin contact
-Wash off immediately with plenty of water and soap for at least 15 minutes.
-Wash and dry carefully contaminated clothing and shoes before reuse.
-In case of contact with chemicals, get immediate medical advice/attention.

3) Inhalation
-Move victims immediately to place with fresh air and not contaminated area.
-Give artificial respiration if victim is not breathing.
-If not breathing, give artificial respiration and have a trained individual administer oxygen.
-Get medical attention immediately if inhaled.

4) Ingestion
-Do not vomiting.
-If person is unconscious, do not induce vomiting or ingested.
-If swallowed, immediately call a POISON CENTER or doctor/physician.

5) Acute and delayed symptoms/effects
-Oral:
short-term exposure: May cause irritation.
long-term exposure: May cause proliferation of the forestomach mucosa.
-Inhalation:
short-term exposure: May cause irritation in the lung and upper respiratory tract and respiratory irritation causing dyspnea.
-Skin contact :
short-term exposure: May cause the formation of crusts, necrotic mass and severe erythema/edema associated with cicatrices.
-Eye contact :
short-term exposure: May cause necrosis and severe irritation.

6) Indication of immediate medical attention and notes for physician
-Get immediate medical advice/attention if exposure.
-Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
-Call 911 or emergency medical service.
-Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
-Keep victim warm and quiet.
-Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.

## 5. Fire-fighting measures

1) Suitable (and unsuitable) extinguishing media
○ suitable extinguishing media:
-Small fire: Dry chemical, $CO_2$, water spray, alcohol-resistant foam
-Large fire: fog or alcohol-resistant foam, water spray
○ unsuitable extinguishing media: Do not use straight streams
○ In case of major fire and large quantities:
-Move containers from fire area if you can do it without risk.
-Use water spray or alcohol-resistant foam.
○ tank/trailer/train truck fire:
-Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
-For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
-Cool containers with flooding quantities of water until well after fire is out.
-Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
-ALWAYS stay away from tanks engulfed in fire.

2) Specific hazards arising from the chemical
○ Thermal decomposition products : Carbon oxides (CO, $CO_2$)
○ Fires and an explosion
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Vapours may explode when mixed with air.
- Will be explosively polymerized by heat or fires.
- Vapours explosion hazard indoors, outdoors or in sewers.
- Containers may explode when heated.
- Most vapours are heavier than air. They will spread along ground and collect in low or confined areas. (sewers, basements, tanks)
- Vapour or gas may travel from a distance in an instance after ignition.

3) Special protective equipment and precautions for fire-fighters
- Protective: safety helmet, AIR CYLINDER MASK(air respirator), fireproof-cloth(heatproof clothes), chemical-resistant gloves
- Stay up wind and keep out of low areas.
- Structural firefighters' protective clothing will only provide limited protection.
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles: cool containers with flooding quantities of water until well after fire is out.
- Keep unauthorized personnel away : Let the fire burn.
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
- Do not inhale the substance itself or the burning artifact.
- Water may be ineffective.
- Attempt extinguish after stop the spilled material.

## 6. Accidental release measures

1) Personal precautions, protective equipment and emergency procedures
- Stay upwind and Keep out of low areas.
-Consider initial downwind evacuation for at least 300 meters (1000 feet).
-CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50meters (150 feet) in all directions.
- Eliminate all ignition sources (no smoking, flares, sparks or flames).
- Stop leak of you can do it without risk.
- Do not touch spilled materials or containers without the protective equipment.
- Water spray may reduce vapour.
- Provide appropriate ventilation system before enter the closed-area.

2) Environmental precautions and protective procedures
○ Atmosphere : Provide sufficient ventilation system.
○ Land : Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
○ Underwater : Prevent entry into waterways, sewers, basements or confined areas.

3) The methods of purification and removal

○ Small spill

-Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).
-All equipment used when handling the product must be grounded.
-Do not touch or walk through spilled material.
-Stop leak of you can do it without risk.
-Prevent entry into waterways, sewers, basements or confined areas.
-Vapours suppressing foam may be used to reduce vapours.
-Absorb or cover with sand or other non-combustible material and remove.
-Use clean non-sparking tools to collect absorbed material.

○ Large spill

-Dike far ahead of liquid spill for later material.
-Water spray may reduce vapour; but may not prevent ignition in closed spaces.
-When spilled over limited quantities, inform central government and local self-government.
-Keep unauthorized personnel away.
-Stay upwind and keep out of low area.

## 7. Handling and storage

1) Precautions for safe handling

-Do not smoking or eating in working area.
-Ventilate entire areas or by local ventilation system.
-Do not breathe gas/fumes/vapours/spray.
-Wash thoroughly after handling.
-Avoid flames, sparks or statics ignition sources.
-Avoid contact with skin, eyes and cloths.

2) Conditions for safe storage

-Store locked up.
-Store and handle in accordance with all current regulations and standards.
-America storage regulation: U.S OSHA 29 CFR 1910. 106. (ground or isoelectric ground)
-Keep below 38℃.
-Keep in a cool, dry place and in well-ventilated place.
-Avoid contact with mixture.
-Keep outdoors or in a closed-area.
-Protect from physical damage.
-Keep away from oxidizing materials.
-Open carefully the lid of the container.
-Keep in a cool, dry place and in well-ventilated place.
-Keep away ignition sources.
-Maintain quarterly the ventilation system.
-Store locked up.

## 8. Exposure controls/personal protection

1) Occupational Exposure Limits

○ Regulation in Korean: TWA : 5ppm(20mg/$m^3$)

○ US (NIOSH/OSHA AGGIH):

- OSHA- TWA: 25ppm(100mg/$m^3$) [skin]
- ACGIH- TWA: 5ppm STEL: 15ppm

○ Biological Exposure Index: Not available

2) Appropriate engineering controls
-Provide local exhaust ventilation system or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value.
-Check legal suitability of exposure level.

3) Personal protective equipment
○ Respiratory protection
Respirator Recommendations NIOSH/OSHA
-10000ppm: Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
-Escape: Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

○ Eye protection
-Wear facepiece with goggles to protect from scattering dust or toxic liquid.
-An eye wash unit and safety shower station should be available nearby work place.

○ Hand protection
-Wear appropriate chemical-resistant gloves that protect chemicals directly.

○ Body protection
-Wear appropriate protective chemical-resistant clothing.

## 9. Physical and chemical properties

| | |
|---|---|
| 1) Appearance | Physical state : Liquid<br>Color : Colorless |
| 2) Odor | Pungent odor |
| 3) Threshold of odor | 0.00024ppm |
| 4) pH | Not available |
| 5) Melting point/freezing point | -72 ˚C |
| 6) Initial boiling point and boiling range | 100 ˚C |
| 7) Flash point | 8 ˚C (closed cup) |
| 8) Evaporation rate | 3.3 (butyl acetate=1) |
| 9) Flammability (solid, gas) | Flammable liquid |
| 10) Upper/lower flammability or explosive limits. | Lower: 1.4% Upper: 14% |
| 11) Vapour pressure | 38.6mmHg (25 ˚C) |
| 12) Solubility(ies) | 15 g/L (25 ˚C) |
| 13) vapour density | 3.45 (air= 1) |
| 14) Specific gravity | 0.9234g/cm$^3$ (20 ˚C) |

| | |
|---|---|
| 15) n-octanol/water partition coefficient | logKow= 1.32 |
| 16) Auto ignition temperature | 355 ˚C (DIN 51 794) |
| 17) Degradation temperature | Not available |
| 18) Viscosity | 0.56cp (25 ˚C) |
| 19) Molecular weight | 100.12g/mol |

## 10. Stability and reactivity

1) Chemical stability
-Avoid contact with light or use above room temperature.

2) Possibility of hazardous reactions
-Closed containers can violently explode.
-Do not contact with heat or light and keep watch on inhibitors.
-Hazardous polymerization may occur if heated.

3) Conditions to avoid
-Containers may explode when heated.
-Avoid heat, sparks, open flames, or other sources of ignition.
-Keep away from waterways or sewers.

4) Incompatible materials
-Peroxides, acid, base, oxidants

5) Hazardous decomposition product
-Thermal decomposition product : Carbon oxides

## 11. Toxicological information

1) Information on the likely routes of exposure
○ Oral:
short-term exposure: May cause irritation.
long-term exposure: May cause proliferation of the forestomach mucosa.
○ Inhalation:
short-term exposure: May cause irritation in the lung and upper respiratory tract and respiratory irritation causing dyspnea.
○ Skin contact :
short-term exposure: May cause the formation of crusts, necrotic mass and severe erythema/edema associated with cicatrices.
○ Eye contact :
short-term exposure: May cause necrosis and severe irritation.

2) Symptoms related to the physical, chemical and toxicological characteristics
-Flammable liquid: Category 2
-Water reactive substances, Organic peroxides: Not applicable (no relevance to molecular structure)
-Refer to "5) Acute and delayed symptoms/effects" of "4.First aid measures"

3) Delay by short term and long term exposures, acute and chronic effect

○ Acute toxicity - Oral : Category 4, $LD_{50}$= 550 mg/kg bw (Rat)
- Dermal : Category 4, $LD_{50}$= 1200 mg/kg bw (Rabbit)
- Inhalation : Category 3, $LC_{50}$= 5.9 mg/kg bw /4hours (Rat)

○ Skin Corrosion/ Irritation: Category 1C
- Moderate to severe erythema and dropsy are observed on rabbits and there is skin irritation on humans and that the skin disease of popular erythematous was observed.

○ Serious Eye Damage/ Irritation: Category 1
- 0.5 ml undiluted n-butyl acrylate was instilled into the eyes of 5 rabbits (one eye per animal). Observed effects ranged from no injury in one rabbit with moderate effects in 2 rabbits and severe effects (iritis) in 2 rabbits.

○ Respiratory sensitizer: Not available

○ Skin Sensitization: Category 1
-The guinea pigs indicate prolonged contacted skin hypersensitivity. This product causes allergic contact dermatitis based on the result of a patch test in humans.

○ Carcinogenecity: Category 2
- IARC: 2B, ACGIH-A4
- NTP, OSHA, Regulation 1272/2008, US EPA: Not listed
- Rat/Fischer 344, 6-12months: Increase in forestomach epithelial hyperplasia for as long as exposure to the test substance continued.
Mouse/C3H/HeJ: Nonneoplastic skin changes, ie, dermatitis, dermal fibrosis, epidermal necrosis and hyperkeratosis, were observed in several mice that received ethyl acrylate. No statistically significant effects on survival were seen. There was no evidence for local carcinogenic but classified 2B of IARC.

○ Mutagenicity: Not classified
*In vitro* - Cytogenetic study test(L5178Y TK+/-3.7.2C mouse lymphoma cells ): Positive
- Ames test (Salmonella typhimurium TA98,100,102,104,1535,1537,1538 ) : Negative
- HGPRT test (CHO cells): Negative
*In vivo* - Micronucleus test (mouse/BDF1): Negative
- DNA damage test (Fischer 344): Negative

○ Reproductive toxicity: Not classified
- Rat/Wistar, oral: Treatment with 400mg/kg/d not statistically significant increase in the number of dead or absorbed fetuses. In offsprings, no adverse changes were found in postnatal development in any of the tested groups.
Rat/Sprague-Dawley, inhalation: Maternal toxicity at 150ppm was reflected in reduced food consumption and body-weight gain. In the fetuses, no significant increase was seen in gross, visceral or skeletal malformations at either exposure level.

○ Specific target organ toxicity (single exposure): Category 3(Respiratory irritation)
- The inhalation toxicity of vapours in rats, rabbits, guinea pigs, and monkeys reported signs of acute irritation in the lung and upper respiratory tract and respiratory irritation caused dyspnea.

○ Specific target organ toxicity (repeat exposure): Category 2
- Based on the human evidence including autonomic ataxia and the evidence including nasal mucosal inflammation, olfactory epithelium degeneration. Administration of the low dose for 13weeks resulted in a slight thickening of the forestomach mucosa. A dose of 200mg/kg proliferations on the forestomach mucosa. These results suggested a correlation between continued epithelial cell proliferation and forestomach carcinogenicity.

○ Aspiration hazard: Not available

## 12. Ecological information

1) Aquatic Ecotoxicity
-Acute toxicity: Category 2
-Chronic toxicity: Not classified
○ Fish : 96hr-$LC_{50}$*(Cyprinodon variegatus)* = 2mg/l (OECD TG 203, GLP)
○ Crustacea: : 48hr-EC50*(Daphnia magna)* = 7.9mg/l
○ Algae : 72hr-$EC_{50}$*(Selenastrum capricornutum)* = 48mg/l

2) Persistence and degradability
○ Persistence : Low persistency due to high volatility and short photochemical degradation.
(logKow of all ingredients are less than 4) (logKow=1.32)
○ Degradability
-Hydrolysis: half-life pH5:244years, pH7:2.8years. pH11:10.3days
-Photolysis: half-life = 5hours

3) Bioaccumulative potential
-Readily biodegradable and low potency of bioaccumulation(logKow=1.32)
○ Biodegradation : readily biodegradation, 60% biodegradation after 5days
(OECD 301C, Modified MITI Test(I))
○ Bioaccumulation : BCF = 6

4) Mobility in soil
- low potency of mobility to soil
Koc=38.87L/kg based on the estimated logKow of 1.32

## 13. Disposal considerations

1) Disposal method
-Incinerate waste.
-Incinerate residues after treatment by methods of evaporation and condensation.
-Incinerate residues after purification by methods of separation, distillation, extraction and filtration.
-Treat with reactions such as neutralization, oxidation, reduction, polymerization and condensation.
-Incinerate residues after treatment by the methods of cohesion, precipitation, filteration and dehydration.

2) Disposal precaution
-Consider the require attentions in accordance with waste treatment management regulation.

## 14. Transport information

1) UN Number : UN 1917
2) UN Proper shipping name : ETHYL ACRYLATES, STABILIZED
3) Transport Hazard class : Class 3 (IMDG Code Flash point : 16℃ c.c)
4) Packing group : II
5) Marine pollutant : Not applicable
6) Special safety response for transportation or transportation measure
○ Emergency schedule for fire : F-E
○ Emergency schedule for spillage : S-D

## 15. Regulatory information

○ Korea
- Korea Occupational Safety and Health Regulation: Listed in occupational exposure assessment, Hazardous agent, Occupational exposure limits and Health examination agent
- Toxic Chemical Control Act. : Not applicable
- Toxic Chemical Control Act. : Not applicable
- Dangerous Material Safety Management Regulation : Petroleum, class 4-1(non water solubility liquid, 200L)
- Waste Control Act. : Public Controlled Waste (Waste organic solvent without halogens)

○ EU Classification
- Classification: F;R11, Xn;R20/21/22, Xi;R36/37/38,R43
- Risk phrases : R11, R20/21/22, R36/37/38, R43
- Safety phrases : S2, S9, S16, S33, S36/37

○ U.S.A. management information
- OSHA regulation (29CFR1910.119) : Not applicable
- CERCLA 103 regulation (40CFR302.4) : Not applicable
- EPCRA 302 regulation (40CFR355.30) : Not applicable
- EPCRA 304 regulation (40CFR355.40) : Not applicable
- SARA 313 regulation (40CFR372.65) : Not applicable
- EPA (40CFR262) : U113 (Hazardous Waste Number)

○ Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade : Not applicable
○ Stockholm Convention on Persistent Organic Pollutants (POPs) : Not applicable
○ Mont- real Protocol on Substances that Delete the Ozone Layer : Not applicable

## 16. Other information

1) Information source and references:

-ECB:ESIS (European chemical Substances Information System) (http://ecb.jrc.it/esis)
-International Uniform Chemical Information Database (IUCLID)
-IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work)., p. S7 216 (1987)
-REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008
-Korea Occupational Health & Safety Agency: http://www.kosha.net
-American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 35
-U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB) (http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.htm)
- ECOTOX Database, EPA (http://cfpub.epa.gov/ecotox)
- ACGIH, TLV and BEIs # 0108, 2008
- The Estimation Programs interface (EPI) Suites, Syracuse Research Corporation
- http://www.safe.nite.go.jp/japan/sougou/data/pdf/hazard/hyokasyo/No-32.pdf
-Korea dangerous material inventory management system (http://hazmat.nema.go.kr)
-National chemicals information systems (http://ncis.nier.go.kr)
-Incorporated Administrative Agency National Institute of Technology and Evaluation (http://www.safe.nite.go.jp/japan/sougou/data/pdf/hazard/hyokasyo/No-32.pdf)

2) Issue date : 2012. 6. 26

3) Revision number and date : 1997. 1. 20 ($9^{th}$)

4) Other material safety data sheet information:
LG Chem LTD., Korea Occupational Health & Safety Agency

## <History>

| Rev. No. | Category | Revision Issue | Date | Respondent |
|---|---|---|---|---|
| 6 | ALL | Team leder Change | 2006.01.15 | Park chan kyo |
| 7 | 1.3 | Emergency response number Change | 2009.08.17 | Park chan kyo |
| 8 | ALL | For GHS Rule | 2010.06.21 | Park chan kyo |
| 9 | 14.4 | IMDG Code Flash point write | 2012.6.26 | Yu seul bin |
| 10 | 1.3 | Address and Emergency response number change | 2014.02.27 | Gwak Byeongsoo |